

Hanford Reservation Site Visit Report

On November 3rd through 5th, 1998, members of the Office of Solid Waste (N. Hunt, R. Joglekar, and G. Ordaz) visited low level radioactive waste (LLRW) and low level mixed waste (LLMW) treatment and disposal facilities at Richland, Washington. We were accompanied by Pam Innis, David Einan, and David Bartus of Region X. Robert Julian of Washington Department of Ecology also joined us for the site visit.

Site Visit Objectives

The primary reason for our visit was to get a better understanding of the similarity and differences in the operation and practices at low level radioactive waste disposal facilities (LLRWDF) to help us establish a baseline protection level offered by the LLRWDF, since LLRWDF requirements are performance based and are, therefore, implemented on a site-specific basis. We also wanted to obtain recent site characteristics data. This is because the Washington State Department of Ecology indicated, during our recent meeting with the States, that our data from DOE on Hanford may be old and inaccurate. In addition, we wanted to find out the types of LLRW and LLMW treatment capability currently available to help addressing the storage issue.

Sites Visited

We visited two commercial facilities, the LLRWDF at U.S. Ecology, and the LLRW treatment facility and the planned LLMW treatment facility at Advanced Technology Group (ATG). We also visited several facilities at the Department of Energy's Hanford Reservation. These facilities included LLRW and LLMW receiving, processing, and disposal facilities, and a pump- and-treat facility at an environmental restoration site. We also observed the morning segment of a meeting of the Hanford Advisory Board, a site-specific advisory group that provides input to and oversight of DOE's cleanup activities at Hanford.

Site Visit Findings

We were able to determine the commonality of disposal practices among commercial LLRWDFs. The minimum common requirement is that all wastes are containerized, at a minimum, in steel drum containers. Wastes with higher radiation levels are contained in NRC approved high integrity containers. Envirocare, however, is an exception since wastes (mainly remediation soils) are bulk disposed.

Disposal practices at the DOE are somewhat different from that of commercial LLRWDFs. This is because DOE facilities are self-regulating, and follow DOE Order requirements instead of NRC regulations. Although many requirements are similar, there are differences between the two regulations. For example, DOE has different radioactive waste classification system, and waste burial container requirements. Wooden crates are used as disposal containers for certain wastes

at DOE sites, a practice which is currently prohibited under NRC regulations. Our tour host was not able to tell us the DOE containerization requirements, but promised to send us information.

Both US Ecology and DOE agreed to provide recent site characteristic data. This will allow us to update our engineering analysis data.

Representatives at ATG told us that their low level mixed waste treatment unit (vitrification) is scheduled to begin operation in early 2000. They developed this treatment capacity after securing a \$30M contract with DOE. They indicated that this treatment capacity would be able to treat some legacy mixed wastes of the nuclear power plants which are currently stored due to lack of treatment capacity.

Following are highlights of our visit:

Commercial Facilities

US Ecology

During the site visit, Barry Bede, Vice President, U.S. Ecology discussed the waste acceptance criteria, waste inspections by a State inspector, and low level waste (LLW) disposal activities. The 100-acre land belonging to DOE Hanford Nuclear Reservation is leased to the State of Washington. U.S. Ecology has subleased the land from the State. Prior to 1993, the facility accepted LLW from generators throughout the country. In 1993, it became a regional facility for eight Northwest Compact States (AK, HI, ID, MN, OR, UT, WA, and WY) and three Rocky Mountain Compact States (CO, NM, and NV). In addition to LLW from generators in these States, the facility receives naturally-occurring and accelerator-produced radioactive material (NARM) from throughout the nation. More than 13 M cubic feet of commercial LLW has been disposed at the site. Containerized LLW is placed in excavated trenches. When completely filled, the trenches are covered with at least eight feet of soil. To date, sixteen trenches have been closed. Four trenches are open and being used for disposal of LLW. Air quality monitoring is done continually, and soil, water, and vegetation sampling is done periodically. Recently, the facility installed seven groundwater monitoring wells and three vadose monitoring wells.

ATG

ATG is a low level radioactive waste (LLRW) treatment facility applying for RCRA and Toxic Substance Control Act (TSCA) permits to treat low level mixed waste and radioactive PCB wastes, respectively.

ATG's existing LLRW treatment capability includes compaction, supercompaction, pyrolysis and vitrification. The supercompaction process compresses a 55-gal drum to 1/5 of its original volume to reduce final volume and cost of disposal. The contents of the drums typically include paper, plastic, and HEPA filters. Bulk metals are also compacted in a separate process. In

September 1998, ATG started the pyrolysis process which treats primarily wood and also accepts bio wastes from pharmaceutical companies, paper, and rubber. This is a batch process and allows the identification of waste generators when disposing the waste residue. The vitrification process was started in October 1997. Currently, paper and plastic are the primary wastes treated by this process. ATG plans to expand the waste to be treated by the vitrification process to include wastes such as spent ion exchange resin, liquids, and waste oil in the future.

ATG is currently applying RCRA part B and TSCA permits for a new mixed waste vitrification unit. ATG developed this treatment capacity after securing a \$30M contract with DOE Hanford to treat contaminated sludge, resin, wood, and clothing. The unit is scheduled to be on line in early 2000.

DOE Hanford Facilities:

Environmental Restoration Disposal Facility (ERDF)

The DOE's ERDF facility is an environmental restoration waste disposal facility constructed and in operation under a CERCLA Record of Decision with EPA Region X. The process of "permitting" and construction of the facility took only 18 months. This facility is in the central part of the Hanford Reservation where ground water is reached at about 300 feet. The DOE has been removing the contaminated soil from the nuclear reactor areas along the Columbia River and disposing of it in ERDF under RODs applicable to each generating operable unit. The local stakeholders agreed to the construction of ERDF under the condition that the DOE clean up the contamination along the river first. The agreement allows only Hanford remediation waste to be disposed at ERDF. Also, the DOE has to build the disposal cells as needed to avoid the appearance of having excess available disposal capacity and therefore attracting waste from off site/out of state. To further address this concern, EPA and WA Department of Ecology agreed to designate this unit under CERCLA instead of RCRA, since CERCLA units can only be used to manage on-site wastes.

The cost of two cells built in 1996 was \$15M including regulatory process costs. The facility is designed to meet RCRA Subtitle C landfill requirements. The only additional element is a 15-foot final cover. Most of the waste disposed at ERDF is contaminated soil. Building debris (cement blocks and metals) and drums of dry wastes are also disposed there. A thin layer of soil cement mixture is applied at the end of every day to control dust. The facility has received 1.2 million tons of waste so far and is now close to capacity of the first two cells. The DOE is planning to add two more cells in 1999.

LLRW Disposal Facilities

There are many LLRW disposal trenches at Hanford. The DOE uses high integrity containers to dispose wastes that are mobile. Drums of wastes, wooden crates, building debris, and equipments are disposed in these trenches. Some of the trenches are closed. Others are still in operation.

The DOE has been disposing of what is now low-level radioactive waste from the beginning of operations at the site, well before RCRA became applicable to mixed wastes or DOE facilities. Although legally disposed of at the time, some wastes currently in closed disposal units would now be considered mixed wastes. A number of these closed disposal facilities are now being remediated under CERCLA authority. We asked for waste acceptance criteria for the LLRW disposal trenches. Our tour host was not able to provide the specifics but promised to send us information about it.

Waste Receiving and Processing Facility (WRAP)

The WRAP limited-access facility has been in operation for approximately eight months, and is operated by a contractor-Waste Management Federal Services of Hanford, Inc. It has an area of 51,300 sq. ft. and cost \$89.1 million to build. Our tour guide indicated that one of the major goals of the facility is to keep exposures to radioactivity as low as reasonably achievable. The facility was designed to maximize the use of robotics to keep exposures low. Most of the movement and processing of waste containers is done remotely.

The mission of the WRAP facility is to process drums and small boxes containing low-level radioactive waste, mixed waste, and transuranic waste in preparation for permanent disposal. Drums of waste come from other areas of Hanford or from other DOE facilities. Drums are bar-coded and information on their individual contents, is available from process knowledge or previous testing, is entered into a database. Specialized equipment allows the contents of drums to be characterized remotely using x-rays and analysis by gamma and neutron assay equipment. An enclosed control room on the second floor enables skilled workers to monitor activities on the main floor including receipt of drums, automated selection of drums from storage, analysis using real time radiography, and packaging. Surveillance is done visually and by monitoring equipment. High tech computers and imaging equipment enable wastes within the drums to be identified and recorded. Amazingly liquids in containers within the drums could also be viewed. Separate glove boxes for mixed wastes and low-level wastes were available if the drum contents could not be determined without opening the drum. The glove boxes were used for sorting and separating wastes which could be disposed from those that required treatment.

WRAP workers inspect, treat, and repackage waste to ensure that it meets the acceptance criteria of the appropriate disposal facility. Using remote equipment, workers are able to x-ray the contents of a drum and measure its radioactivity from workstations within the safe confines of the control room. Mixed wastes may be treated off site at commercial treatment facilities and returned for disposal. Containerized wastes are prepared for transport to a regulated site for permanent disposal. TRU wastes will be transported to the Waste Isolation Pilot Plant for underground disposal. Disposal of low-level and mixed wastes will be in the Low-Level Burial Grounds and the mixed-waste disposal trenches, respectively, at Hanford.

Other DOE Facilities

1) We looked at the outside and the interior of a contaminated building that, at present, is slated to be demolished. However, the resulting debris would become waste and require disposal. The building, referred to as “the canyon,” is where highly radioactive material was processed. The canyon facility has unique features that make it potentially suitable for long-term disposal and/or isolation of radioactive wastes. DOE’s contractor is proposing to use the contaminated building as a disposal facility for the vitrified low level mixed waste from Hanford tank waste.

2) We also toured a facility where water contaminated with RCRA components and radionuclides was pumped from underground, treated through ion-exchange units and released back into the ground.

3) Another project we toured involved injecting a chemical into the ground to create a reactive barrier to intercept contaminated groundwater flowing toward the Columbia River. Groundwater flowing through soils contaminated with toxic hexavalent chrome is leaching the toxic chemical into the river. Salmon hatchlings are particularly susceptible to hexavalent chromium, and this segment of the Columbia River is a salmon spawning ground. The chemical injected changes the oxidation state of the area and transforms the toxic, highly mobile hexavalent chrome to the less toxic, less mobile trivalent chrome.

DOE’s Public Meeting

We observed part of the DOE Hanford Site Specific Advisory Board (SSAB) meeting. The SSAB is a public forum which provides input to and oversight of the DOE on activities at Hanford. The SSAB consists of interested local and regional groups including: local, regional, and state governments, business groups, site workers, tribal governments, and environmental interest groups. EPA Region X office indicated that this group has played an influential role in DOE Hanford’s environmental and cleanup activities. The SSAB has successfully directed DOE’s focus to activities important to the group. The meeting commended the attention of high level managers from both the DOE and the regulators. The DOE’s Hanford Field Office Manager, EPA Region X, and WA Department of Ecology management were all present at this meeting.

During the morning we observed, the Board listened to a presentation from a local citizen (a former Congressional staffer) who championed the establishment of a new office, Office of River Protection (ORP), to oversee the Hanford high level tank waste privatization effort. His effort focused on obtaining Congressional support, and DOE Headquarters attention and budget allocation for this major initiative at Hanford to ensure its success. The Board also listened to a GAO presentation on its evaluation of the Privatization contract. GAO criticized the DOE for assuming more risk than originally planned while maintaining the same level of contractor profit under the current phase of the contract. The presentations were followed by numerous questions posed by the Board to the DOE on various aspects of the ORP and the privatization contract.